

PLIBRICO REFRACTORY PRODUCTS



PLIBRICO JOINTLESS FIREBRICK COMPANY

CHICAGO, ILL. - TRENTON, N.J. - FIREBRICK, OHIO - TORONTO, ONT.



FEB 6 1935

PLIBRICO REFRACTORY PRODUCTS » »

A general catalog covering
Plibrico Jointless Firebrick and
other Plibrico refractory products

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Plibrico Jointless Firebrick Co.

PLIBRICO JOINTLESS FIREBRICK CO.

General Offices: 1800 KINGSBURY STREET • CHICAGO, ILLINOIS

FACTORIES at CHICAGO, ILL., TRENTON, N. J., FIREBRICK, OHIO, and NEW TORONTO, ONT.





SOLID—JOINTLESS—MONOLITHIC

A lining of Plastron, Incoloy Firebrick, after a period of service in connection with a large Stirling boiler burning pulverized coal. Note how this plastic material is baked out by the fire, forming a monolithic lining without a single joint. Deposits on the side walls are usual slag accumulation.

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2010-2011-12

FACTORY- SLICED 100 LB. PACKAGE

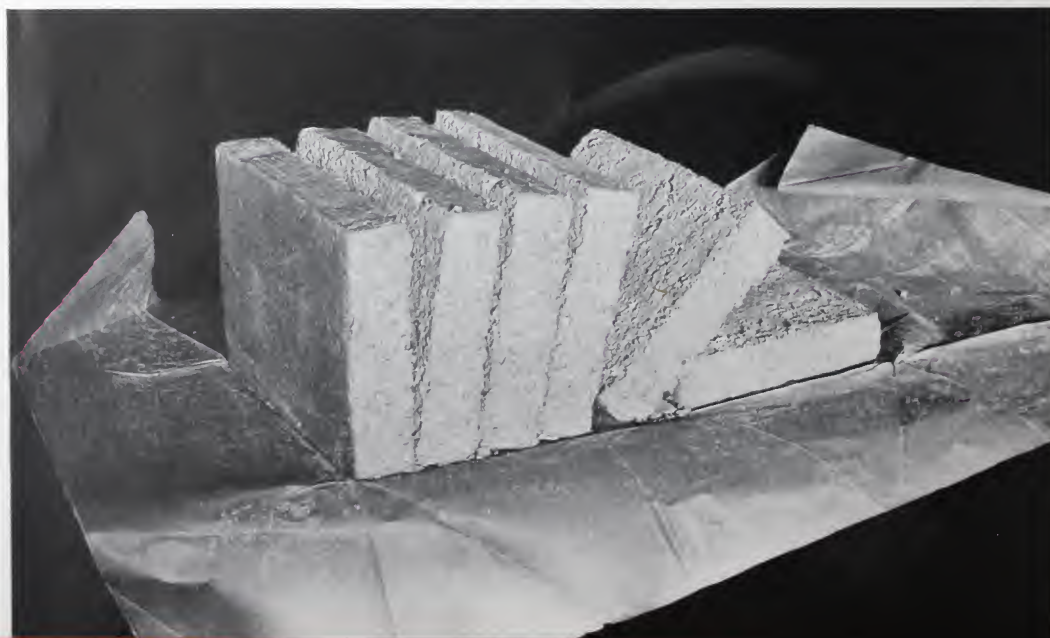
PLIBRICO is now packed in fibreboard cartons which weigh 100 lbs. net and contain $\frac{3}{4}$ cu. ft. As illustrated, in these cartons the material comes wrapped in an air-tight, moisture-proof wrapper and sliced into six slabs approximately 2" thick and 9"x12" in size for convenient installation.

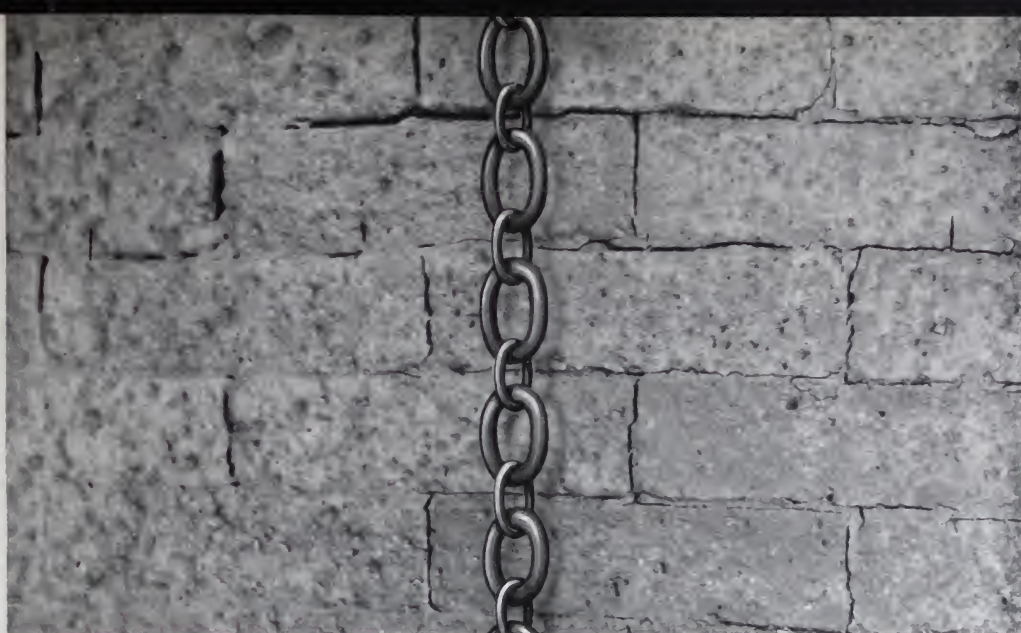
The use of these slabs eliminates cutting up the material on the job and appreciably speeds up installation. In our own installation department, we have found that the use of this factory-sliced package effects a saving of more than 20% in installation labor cost.

The cartons are more easily handled, more quickly opened, and more readily disposed of than our 665 lb. drums. In equivalent quantities, the price of Plibrico is the same in cartons as in drums.

This new type of package is now available at practically all warehouse points throughout the country. Our standard steel drum, which contains five cu. ft. of material and weighs about 665 lbs., will not be discontinued but will be furnished where desired.

The factory-sliced package is exclusive with Plibrico. We know of no other plastic refractory material packed in this manner.





PLIBRICO JOINTLESS FIREBRICK

ELIMINATES THE WEAK JOINTS

IT is now an accepted fact that the thousands of weakening joints present in a firebrick lining are the real cause of furnace failure.

In your firebrick lining, every joint is a weak link. Just as a chain is no stronger than its weakest link, your firebrick lining is no stronger than its joints.

Firebrick walls rarely burn out. Almost without exception, they bulge and collapse while the individual bricks are still in serviceable condition. You can find the proof of this statement on your own dump pile.

The joints open up under the inferno of the fire. Heat and flame penetrate the lining. Corners and edges fuse and spall as they are exposed to the fire. Bricks loosen, and the wall bulges as the header courses break away. The collapse of the wall begins, and repairs and replacement soon follow.

SOLID—JOINTLESS—MONOLITHIC

Our Plibrico Jointless Firebrick eliminates the weak joints of laid-up firebrick construction. There are no weak links in a monolithic Plibrico lining.

5 Plibrico is a superior refractory material in plastic, semi-baked form. It is formulated from

highest-grade flint and fire clays mined from our own mines. Its Pyrometric Cone Equivalent (fusion point) is over 3100 deg. F.

Plibrico weighs approximately 133 lbs. per cubic foot. It is shipped in plastic condition ready for immediate installation as received without mixing, the addition of water, or other preparation. It is packed in 100-lb. fibreboard cartons as shown opposite, also in steel drums weighing approximately 665 lbs.

Plibrico is installed in small pieces with a steel hammer or pneumatic rammer. It is then trimmed with a trowel or other sharp instrument and baked out by the fire, forming a solid, monolithic lining without any weak, vulnerable joints.

The series of photographs shown in the several pages following picture the installation process clearly. It will be noted that Plibrico is not installed as a coating over the existing firebrick lining but entirely replaces both firebrick and bonding cement.

A Plibrico lining is solid—jointless—monolithic. It expands and contracts en masse—as one single unit. Obviously, such a wall is stronger, more durable, and longer lived than a firebrick wall composed of thousands of individual bricks

insecurely patched together.

Monolithic Plibrico construction gives all of the life that might be expected from the best firebrick—plus the additional life assured by its jointless form. In practically every installation, Plibrico outlasts ordinary firebrick construction at least 100%. In many cases, Plibrico outlasts firebrick three or four times.

PLIBRICO SAVES FUEL

By eliminating leaky joints, Plibrico construction provides an air and gas tight setting which minimizes the infiltration of excess air into the furnace. The resulting increase in CO₂ and combustion efficiency effects a considerable saving in fuel.

The elimination of the joints also reduces heat loss from radiation through the setting which results in an additional fuel saving.

PLIBRICO WILL NOT SPALL

Spalling is a common cause of deterioration with firebrick. As the joints open up, the corners and edges of the brick are exposed to the fire. Spalling and cracking result. A Plibrico lining will not spall because the joints are entirely eliminated.

ELIMINATES SPECIAL SHAPES

Stocking a variety of costly tile shapes is unnecessary where Plibrico construction is used. Being plastic, Plibrico can readily be moulded to any desired shape.

By building simple, wooden forms, Plibrico can also be used to make precast shapes for stock. Such shapes can be baked out in an industrial furnace or in the combustion chamber of a boiler.

ECONOMICALLY REPAIRED

When a Plibrico lining requires repair along the grate line, it can be cut away and dovetailed, as shown opposite, for quick and easy replacement.

With firebrick, it is practically impossible to prevent the entire wall from falling in when grate line repairs become necessary since, in most cases, the header courses (which are supposed to support the firebrick lining) either snap off or pull out, as fully explained in pages 10 and 11. Page 11 also shows how our Flexo-



Anchors support the section above when grate line repairs are required in connection with a Plibrico lining.

REDUCES CLINKER TROUBLE

Because there are no joints in a monolithic Plibrico wall, clinker does not adhere as tenaciously to a Plibrico lining as to a firebrick wall. Clinkers can be removed from a Plibrico lining with a minimum of damage to the surface of the wall because there are no individual brick to be pulled out of the wall by the slice bar.

GET OUR QUOTATION

Because it far outlasts ordinary laid-up firebrick, and because it reduces fuel cost, monolithic Plibrico is the most economical refractory material that you can use in connection with boilers, incinerators, oil stills, and industrial furnaces, ovens, and kilns of all kinds. Plibrico can be used to advantage wherever firebrick is used.

We will be glad to quote on Plibrico for your next repair job. Your local Plibrico representative (see page 29) would be pleased to call at your plant at any time to inspect your furnaces and to quote on our material.

AMOUNT REQUIRED

The quantity of Plibrico required for any work can be accurately computed by using the figure of 133 $\frac{1}{3}$ lbs. per cubic foot. The convenient table below gives the amount of material necessary per square foot of wall area in different thicknesses:

4 $\frac{1}{2}$ " walls—	50	lbs. per sq. ft.
6" walls—	67	lbs. per sq. ft.
7" walls—	78	lbs. per sq. ft.
9" walls—	100	lbs. per sq. ft.
12" walls—	133 $\frac{1}{3}$	lbs. per sq. ft.

The above figures cover average thicknesses. For instance, a wall 9 in. in width at the base tapering to 5 in. in width at the top is figured as 7 in. in average width.

DEMAND GENUINE PLIBRICO

We have been making Plibrico for more than twenty years and are the oldest manufacturers of plastic firebrick material in existence. Our position in the industry has never been challenged. Only superior quality is responsible for Plibrico's popularity and extensive use.

Do not accept a substitute for genuine Plibrico. The fire finds the difference that the eye may not detect.

1—The first step in the installation of Plibrico Jointless Firebrick is shown opposite. The workman is laying the convenient 2 in. slabs in position against the outer brick wall.



2—Then the plastic material is solidly pounded into place. A steel hammer or pneumatic rammer may be used to amalgamate the plastic material.





3—This picture shows the Plibrico lining built up to a height of several feet. With the convenient Plibrico slabs, the work progresses rapidly.



4—Here the workman is installing the Flexo-Anchors. These anchors tie the Plibrico lining to the outer wall. They are described in detail on page 10.

5—This picture shows the workman trimming the partially-completed Plibrico lining down to a smooth surface and desired thickness. A sharpened spade or other sharp instrument is used for trimming.



6—The finished job—a complete monolithic Plibrico lining in connection with a 400 hp. oil-fired Heine boiler, showing the rear wall and one side wall.



HOW PLIBRICO PREVENTS BULGING

THE left section of the sketch on the opposite page shows why the bulging of firebrick walls is so common. In service, the face of a firebrick wall is subjected to a temperature several times as great as the temperature to which the common brick wall is subjected. Expansion of the firebrick is consequently several times as great as the expansion of the common brick.

The firebrick lining is tied to the common brick wall by "header" courses projecting into the common brick, as illustrated. Under the strain of expansion, these headers either snap off or pull out, as shown. In either case, the tie is broken and nothing is left to prevent the firebrick lining from bulging towards the fire.

Bulged bricks burn and spall as overhanging corners and edges are exposed to the full blast of the fire. As the joints open up, the fire penetrates behind the firebrick lining and the destruction of the wall is complete.

Contrast the weakness of firebrick construction with the solidity of our monolithic Plibrico construction, shown at the right in the sketch.

Our patented Flexo-Anchor is a positive guarantee against bulging. This ingenious device securely ties the Plibrico lining to the common brick wall, but allows free movement with expansion and contraction. The Flexo-Anchor is furnished in two types—either highest-grade refractory material or special heat-resisting metal.

Our refractory anchor is shown in the photograph



The famous metal Flexo-Anchor. Now used only for zones of moderate temperature.

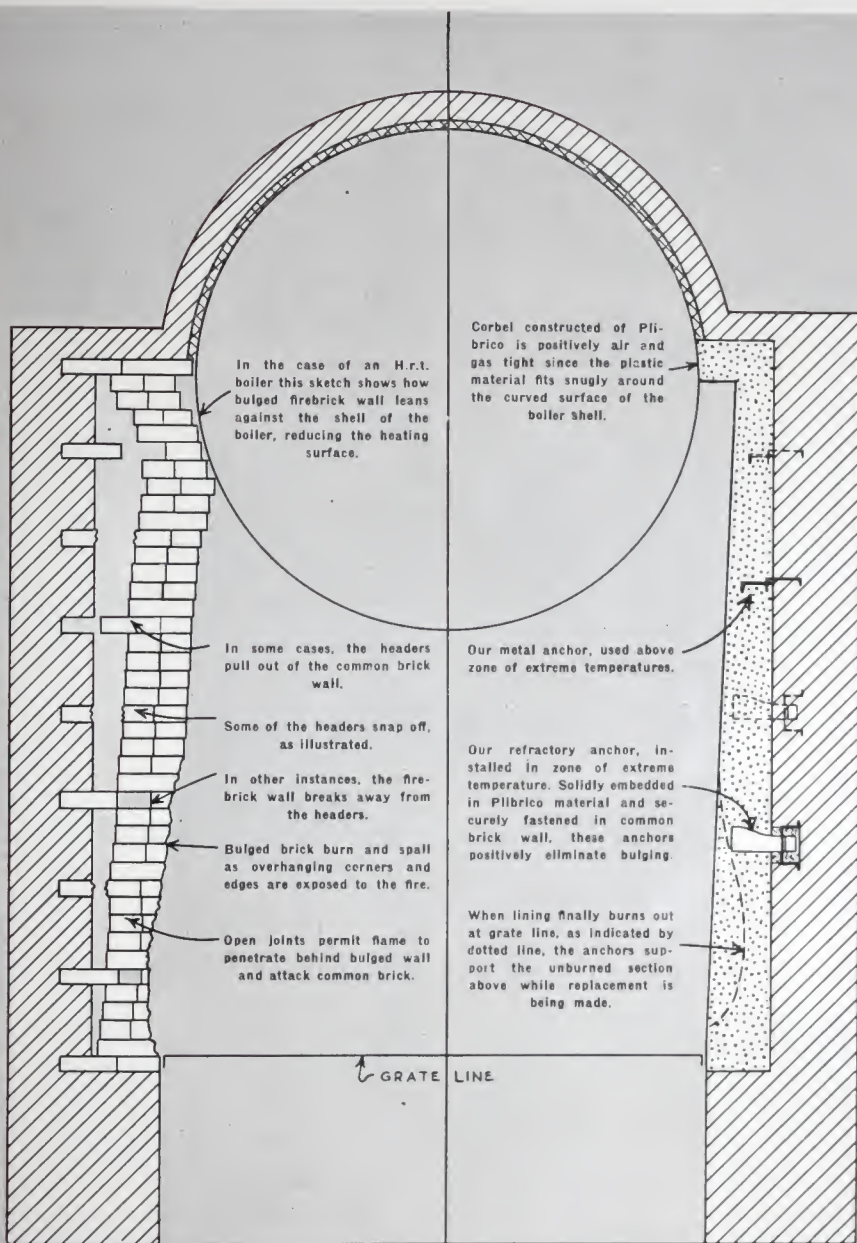
below. It can be easily installed as shown in connection with either new or existing walls. It will be noted that with this anchor no metal parts are embedded in the refractory lining. All metal parts are located behind the Plibrico lining. To further protect the metal bracket from the heat, the pocket is packed with insulating material when the anchor is installed.

Our metal anchor, shown above, which has been used in thousands of installations, is furnished for use in connection with Plibrico installations where suitable.

It will be noted at the right in the sketch that our Flexo-Anchors can be depended upon to support the Plibrico lining even when the section along the grate line has been removed for replacement. Under similar circumstances, a firebrick lining will almost invariably collapse completely.



The refractory anchor, for zones of extreme temperature. Note that with this type of anchor all metal parts are located outside of the refractory lining.



FIREBRICK CONSTRUCTION

Showing why firebrick walls bulge. Under the strains of expansion, the header courses tying the firebrick lining to the common brick wall either snap off or pull out, allowing the firebrick wall to bulge into the furnace.

PLIBRICO CONSTRUCTION

In a Plibrico lining, our Floxo-Anchors are a positive guarantee against bulging. While allowing the Plibrico lining to move freely with expansion, they securely anchor the lining to the exterior wall.

WHY PLIBRICO IS IDEAL FOR FRONTS

MONOLITHIC Plibrico is particularly suitable for fronts in boiler and other types of furnaces where door arches or burner or retort openings must be constructed. Since the material is plastic, it can be readily moulded to any shape required.

The photographs opposite show the various steps in the construction of a typical Plibrico front. Note how easily the door arches have been moulded to the desired curvature, and how snugly the material fits around the boiler shell, completely protecting the boiler rivets.

Contrast the solidity of monolithic Plibrico construction with the firebrick construction shown below. Note how the joints have opened up, allowing the bricks to loosen, and how the sagging brickwork allows the gases to short-circuit into the smoke box and exposes the rivets.

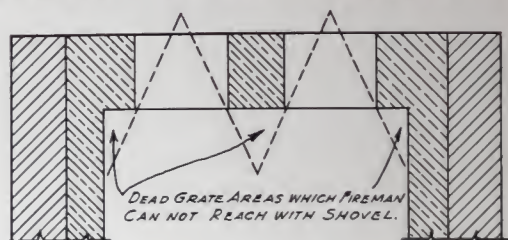
The photograph clearly shows the excessive amount of cutting and patching necessary when fitting firebrick around the shell of an H.r.t. boiler and is convincing evidence of the fact that a good substantial front is impossible in this type of boiler with firebrick construction.

ELIMINATES DOOR LINERS

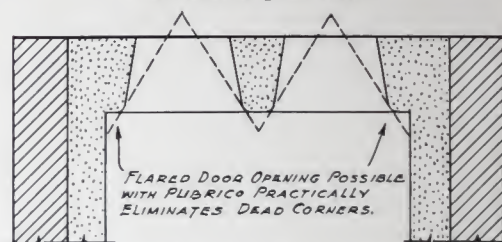
In hand-fired boilers, cast-iron door liners are ordinarily used to support the door arches and to protect them from the firing tools. Such liners are costly, and they soon burn out. In many cases, they warp and bulge with consequent injury to the door arches.



A firebrick front after a short period of service.



Firebrick front showing straight door jambs and unreachable grate areas.



Plibrico front showing flared door openings.

No door liners are required in a monolithic Plibrico front since there are no individual bricks to be knocked out by the fireman's shovel.

FLARED DOOR JAMBS

With firebrick construction, it is extremely difficult to build a door arch with flared jambs and center pier. As shown in the upper sketch, with straight jambs the fireman's shovel cannot reach the entire grate surface, and it is impossible for the fireman to keep a good fire over the entire grate area.

As illustrated in the lower sketch, a flared door opening can readily be constructed with plastic Plibrico. The dead corners are eliminated, making it possible for the fireman to reach the entire grate surface without difficulty.

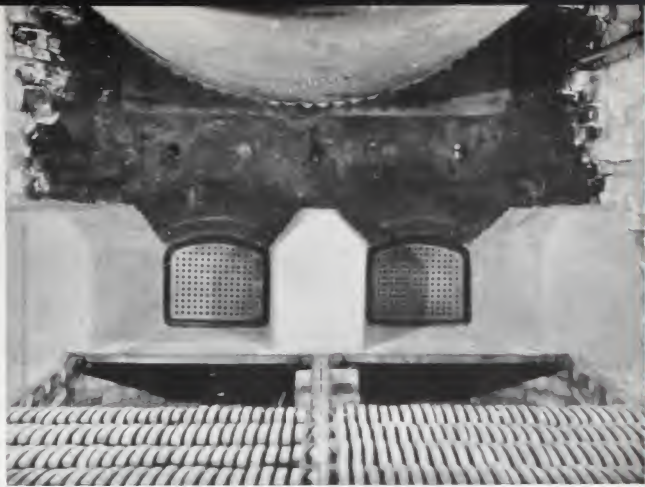
With firebrick construction, the top of the door arch is ordinarily built flat, making it difficult for the fireman to spread his coal evenly. Where Plibrico construction is used to build door openings, the top of the door arch is flared upwards.

REFRACTORY DEAD PLATE

Ordinary cast-iron dead plates are expensive and soon warp and crack. A refractory dead plate can be easily and inexpensively constructed of Plibrico. This type of dead plate can be economically replaced when necessary without disturbing the front. Detailed information on request.



The first step in building a front arch with Plibrico—like any Plibrico job—is the complete removal of the old firebrick lining.



Then the construction of the front with Plibrico is begun. The above photo shows the door jambs and center pier completed.



In this picture, temporary wooden forms resting on loose bricks have been placed in position for supporting the door arches.



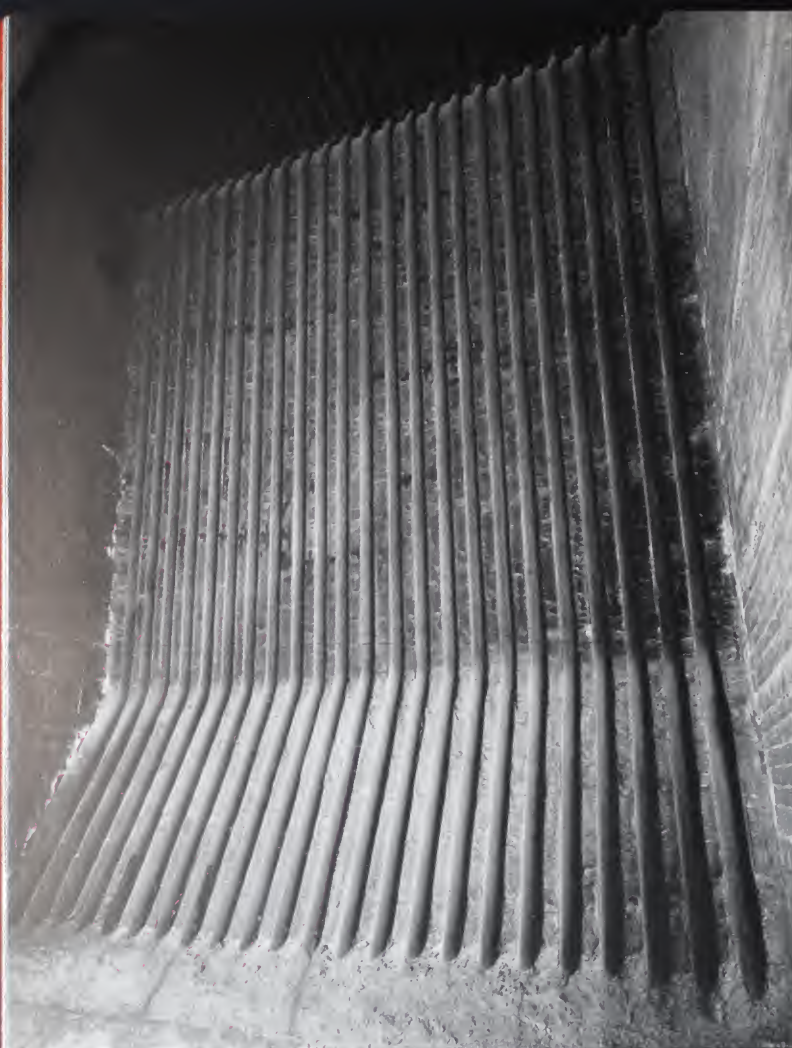
Here the workman is pounding the Plibrico material in place with his steel hammer. Photo shows door arches partially completed.



Now the lining is being trimmed with a trowel. Note ease with which plastic material is moulded around steam jets.



This picture shows the completed Plibrico front ready to be baked out for a long life of good service.



Water wall with backing of Plibrico Jointless Firebrick in connection with a 756 hp. Bros boiler. Water wall consists of twenty-three $3\frac{1}{4}$ " tubes on 7" centers.

PLIBRICO for WATER WALLS

PLIBRICO has been extensively used for water walls, particularly in connection with the bare tube type. The photograph above shows a typical installation of Plibrico in connection with a water wall.

Plibrico is advocated for the construction of water walls because it possesses the following distinct advantages:

- 1—Since it is plastic, Plibrico is adaptable to any tube size, tube center, or refractory thickness. It eliminates the need for the variety of special shapes which are required with refractory tile.
- 2—Special shapes cannot always be obtained promptly, particularly where non-standard shapes and sizes are required. Plibrico can always be supplied without delay from warehouse stocks in over 100 principal industrial centers in the United States and Canada.

3—Plibrico is altogether jointless. There is no open joint behind the tube when Plibrico is employed. This monolithic backing helps to keep the furnace gas and air tight.

4—Plibrico assures maximum heat transfer to the tubes. It hugs the tubes closely, eliminating any open space in which ash or slag can accumulate to act as an insulator.

Plibrico is likewise excellent for repairing in the case of tube rupture with consequent damage to the refractory backing. The damaged section can be easily patched with Plibrico while it would be necessary to replace a complete section if repairs were made with tile.

Boiler manufacturers and interested engineers are invited to communicate with our engineering department for more detailed information about this application of our material.

Plibrico arch in connection with H.r.t. boiler equipped with pulverized coal burner. Note Arch Anchor Tile supporting the arch.

The PLIBRICO SUSPENDED ARCH

MONOLITHIC construction with Plibrico Jointless Firebrick is ideal for suspended arches of all types. Plibrico arch construction outlasts other types of construction, reduces spalling, prevents air infiltration, and increases combustion efficiency.

The basic feature of the Plibrico arch is our exclusive Arch Anchor Tile which support the arch. They are suspended from simple steel frame work or from existing cast-iron hangers.

A Plibrico arch will give much longer service than an ordinary brick or tile arch. With ordinary construction, cold air enters the furnace by means of the open joints around the brick and tile, subjecting the arch to a severe spalling action. A Plibrico arch is not subjected to this spalling action, because no cold air can enter through its solid, jointless construction.

Another important advantage of the Plibrico arch is the fact that the steel frame work from which the arch is suspended will last longer than the cast-iron hangers used with tile arches. With the ordinary tile arch the hangers burn and warp because they are partially surrounded by the tile,



but with the Plibrico arch the metal supports are not embedded in the refractory material.

With tile or brick arches, the infiltration of cold air through the joints lowers the temperature of the arch, reducing its effectiveness as a heat radiating and reflecting surface, and retarding the combustion of the fuel. Since there are no leaky joints in a monolithic Plibrico arch, no cold air can enter through it and the maximum surface temperature is maintained.

Ignition and combustion of the fuel are consequently accelerated, contributing to combustion efficiency. By eliminating the excess air which leaks through the ordinary arch, Plibrico arch construction also effects a considerable increase in CO₂.

In the design of ignition arches, the shape and contour is a most important consideration. Being constructed of plastic material, Plibrico arches are not limited to any particular shape, and can be built to any contour which will best meet the requirements of each furnace.

Your local Plibrico representative would be pleased to give you more detailed information on Plibrico arch construction and to quote on any arch work which you may be contemplating, including labor for installation. Our engineering department will gladly prepare blueprints showing in detail the design of the Plibrico arch for any unusual application.

If you are operating boilers or industrial furnaces provided with suspended arches, we will be pleased to mail you a copy of our special bulletin covering the Plibrico Suspended Arch upon request.

Suspended arch 9'8" x 8'0" constructed of Plibrico for 500 hp. Keeler boiler after several months at ratings up to 175%.



Above: Complete Plibrico lining in connection with a 150 hp. H.r.t. boiler equipped with a Strong-Scott pulverizer after two years of operation at 200% of rating without repairs.

Below: This photograph shows a complete lining of monolithic Plibrico in connection with a gas-fired boiler. This photograph was made after several months of service.



Above: Dutch oven lined with Plibrico in connection with a boiler burning wood refuse and coal. Picture taken immediately after installation before the lining was baked out.





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Below: Installing a Plibrico lining in connection with a 300 hp. Heine boiler equipped with Westinghouse stoker. One of two similar installations at a western central station.



Above: A complete lining of Plibrico in connection with a large tube still at a prominent oil refinery. Shows adaptability of Plibrico construction for industrial furnaces of all types.

Below: Plibrico lining in connection with a garbage incinerator after months of hard service. Illustrates ease with which complicated shapes can be constructed with Plibrico.



SUPERIOR RAW MATERIALS

THE Plibrico clay mines are located at Firebrick, Ohio, where we own 1200 acres of the finest deposits of flint and bonding clay in the United States. The acreage is in Lawrence and Scioto counties in the center of a district famed for the superb quality of its fire clays.

The incomparable quality of the bonding clay mined on this property is responsible in no small measure for Plibrico's superiority. This clay is unique in its possession of both exceptional bonding strength and high refractoriness.

For fifteen years, all of the bonding clay used in the manufacture of Plibrico Jointless Firebrick has been mined on this property. We have been using bonding clay from this tract at our plant at Trenton, New Jersey, ever since the production of Plibrico was begun there, although there are numerous deposits of refractory clays much closer to Trenton in Pennsylvania.

After analyzing fire clays from every section of the United States and failing to locate any other

deposits combining both bonding strength and refractoriness to an equal degree, we purchased the mining property in 1929 to assure a continuous supply of this unmatched bonding clay.

In a Plibrico lining, shrinkage is practically eliminated and cracking, in consequence, is negligible. The superior bonding strength of our bonding clay is responsible for this superiority of Plibrico, coupled with the fact that the calcined clays used in Plibrico are adequately pre-shrunk by burning to extreme temperatures.

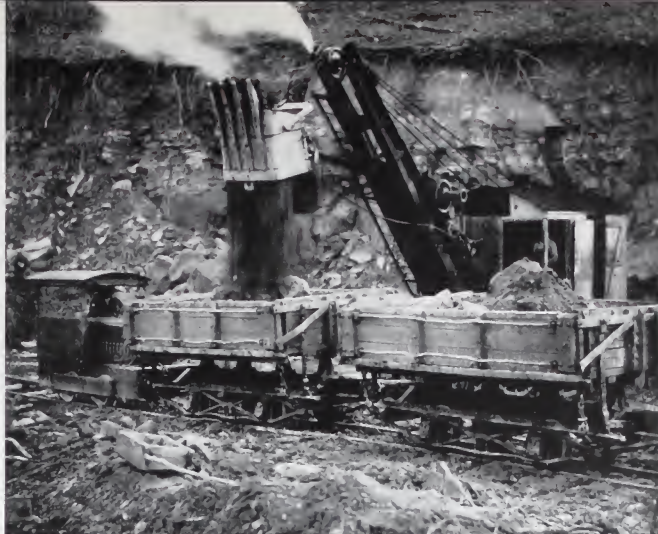
In all analyses, Plibrico runs very close to the ideal percentage of alumina. Its freedom from impurities is evidenced by a negligible flux content. A minimum and uniform moisture content is maintained.

No plastic firebrick material can be any better than the clays from which it is manufactured. The clays used in Plibrico are the most suitable on the continent for the manufacture of a high-grade plastic material.



Our clay preparation and manufacturing plant in connection with our mines at Firebrick, Ohio.

This photo shows a steam shovel stripping overburden from a deposit of fire clay at our clay mines. Three steam shovels are employed in stripping operations. All of our clay is mined in daylight from open benches.



Loading the clay from which Plibrico is manufactured. This grade of clay is mined by hand in daylight pits so that it can be selected from the proper vein with careful discrimination.



A trainload of clay being hauled from the mines to the preparation plant over a picturesque trestle on our tram road at the Firebrick property. Each of our cars holds seven tons of clay.



UNEQUALLED MANUFACTURING FACILITIES

THE three modern factories shown here and the properties described in the preceding pages are devoted to the manufacture of Plibrico Jointless Firebrick as our principal product. Plibrico is now being shipped from four strategically-located factories.

The Chicago plant, shown below, also houses our general offices and engineering department. This modern factory was built in 1925, replacing a succession of smaller plants which were quickly outgrown. The Trenton plant, originally erected in 1923, was completely remodeled with double capacity in 1929. The Toronto plant was established by our Canadian company in 1933.

Improved manufacturing processes have been incorporated in all plants. Completely automatic operation is an assurance of absolute uniformity at all times.

Each mixer is supplied from overhead storage bins. Each of the supply pipes is equipped with a measuring device which controls to the fraction

of an ounce the supply of each ingredient to the mixer. Even the moisture content is automatically proportioned.

It is our usual practice to ship all orders going forward from our factories the same day received. For local shipments, convenient warehouse stocks are maintained in all principal industrial centers. (See page 29.)

We maintain complete ceramic laboratories at our Firebrick and Trenton plants. At the Firebrick laboratory, raw materials are analyzed and tested before they are used in the manufacture of Plibrico to make certain that they do not fall below our rigid standards. The Trenton laboratory is thoroughly equipped for experimental and development work.

Our Chicago plant is equipped with two 150 hp. H.r.t. boilers—one oil-fired and one stoker-fired. In addition to their regular duties, these boilers serve as a practical laboratory for experimental purposes.



Manufacturing plant and general offices of the Plibrico Jointless Firebrick Co. at Chicago, Ill.



The photograph above shows our Eastern plant located at Trenton, N. J. This plant is half-way between New York City and Philadelphia to serve these large markets, and is well-located for export shipments.

The photograph below shows our Canadian plant at New Toronto, Ontario. This factory was established in 1933 and is operated by our Canadian company, Plibrico Jointless Firebrick, Limited.





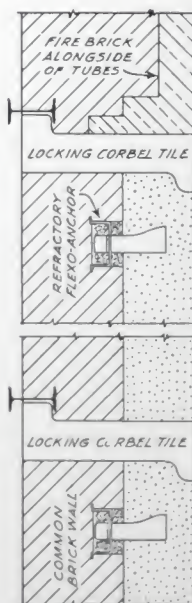
PLIBRICO LOCKING CORBEL TILE

OUR Locking Corbel Tile has completely revolutionized the construction of monolithic linings in connection with water tube boilers.

As shown opposite, when installed at the tube line in the side wall of a boiler furnace, the Corbel Tile support the firebrick lining above the tube line at all times. When the refractory lining below the tube line is being replaced, the Corbel Tile prevent the firebrick above from collapsing or leaning over against the tubes.

A further advantage of this type of construction is the fact that the Corbel Tile transfer the weight of the firebrick above the tube line to the exterior wall, eliminating objectionable buckling stresses in the firebox. In conjunction with our Flexo-Anchors, they eliminate any possibility of bulging.

The photograph above shows the application of the Corbel Tile, in connec-



Showing Corbel Tile used at tube line (above) and for sectionalizing (below).

tion with a 500 hp. Stirling boiler, for constructing sectional walls. With this construction, the monolithic Plibrico wall is divided into several sections, with each section supported by a row of Locking Corbel Tile.

The tile transfer the weight of the various sections to the outer brick wall. The individual sections are free to expand and contract independently of each other, and any section can be repaired when necessary without disturbing other sections.

The Locking Corbel Tile can be used in connection with existing settings with minor rebuilding of the outer brickwork, as well as for new boiler settings, and can be easily replaced if necessary.

The several types of construction made possible by the use of Plibrico Locking Corbel Tile are covered by comprehensive patents dated July 28, 1931.

THE PLIBRICO AIR-COOLED WALL

THE drawing below shows the Plibrico air-cooled wall as installed in connection with a battery of two typical water tube boilers. This simple construction has proved highly satisfactory where it is desirable to cool the refractory lining, and can be installed for only a small increase in the cost of a solid lining.

The same freedom from joints which is responsible for the superiority of Plibrico for solid walls makes it ideal for air-cooled construction. The absence of leaky joints in the Plibrico air-cooled wall prevents furnace gases from seeping into the air lanes or infiltration of excess air.

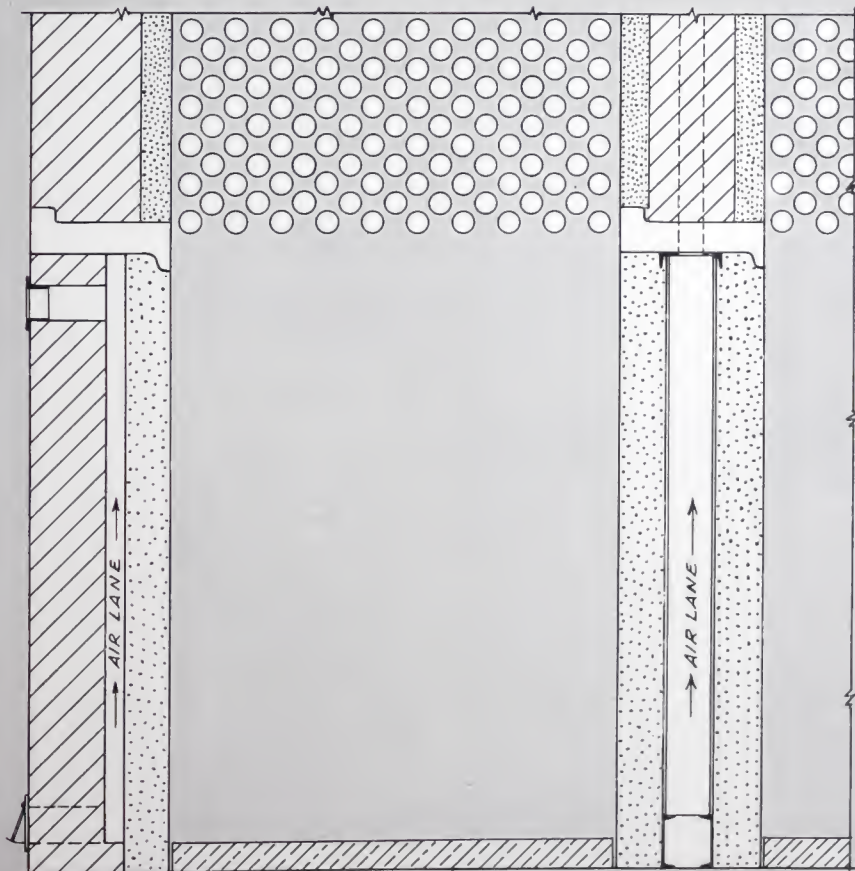
It will be noted that our Locking Corbel Tile, described on the opposite page, is an important feature of the Plibrico Air-Cooled Wall where erected in connection with large furnaces.

With the Plibrico Air-Cooled Wall, the air ducts

can be easily arranged to supply pre-heated air for the furnace or for the coal driers where pulverized fuel is used.

Attention is called in particular to the center wall construction shown below. With our construction, an air-cooled center wall, with a full 9 in. refractory lining on either side, can be built in a minimum of 24 in. In numerous plants which had been experiencing trouble with their center walls for years, the annoying problem has been permanently solved by the installation of an air-cooled Plibrico center wall.

Upon receipt of blueprints, our engineering department would be pleased to prepare drawings showing how our air-cooled construction can be adapted to any boiler, or to any section of a furnace where excessive maintenance is now required.





PLIBRICO AIR-SET

PLIBRICO AIR-SET is an air-setting mixture of high-grade refractory materials. It differs from our regular Plibrico Jointless Firebrick in that it is shipped dry and, after being mixed with water, sets to a concrete-like hardness without the application of heat.

This kind of material is frequently referred to as "refractory concrete" or "hydro-type" refractory.

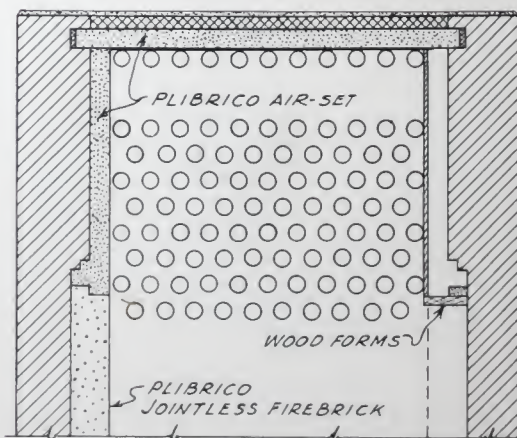
Plibrico Air-Set is made in two grades—No. 15, a low-temperature material with a P.C.E. of 1500 deg. F., and No. 27, a higher-temperature material with a P.C.E. of 2700 deg. F. In each grade, the ingredients are properly proportioned and blended to produce the most suitable material for a variety of special applications.

As already mentioned, Plibrico Air-Set is shipped in dry form. After being mixed with water to the proper consistency, the material is poured into place between forms like concrete. As the material sets rapidly, it must be used immediately after being mixed with water. After installation, the material sets like concrete without the application of heat. Shrinkage is negligible, so the material is entirely free of cracks or "checks."

Plibrico Air-Set should be mixed in the propor-

tions of $2\frac{3}{4}$ parts of water to 10 parts of Air-Set (by volume). After pouring, No. 27 should be allowed to stand at least 12 hours before heat is applied while No. 15 should be allowed to stand at least 24 hours.

Plibrico Air-Set is shipped dry in 100 lb. moisture-proof bags, as shown above. To determine the amount of material required for any work, figure 110 lbs. per cubic foot installed.



Plibrico Air-Set used alongside tubes in cross-drum boiler, also for tube deck.

ABOVE TUBE LINE

One of the major applications for Plibrico Air-Set is in connection with water tube boilers for the refractory lining above the tube line.

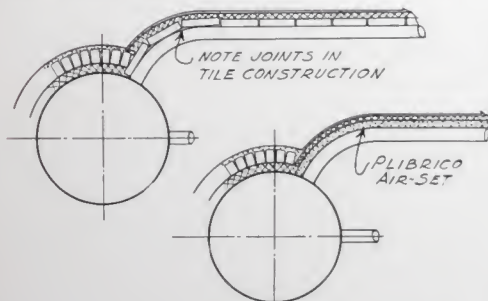
Because of the rapid transfer of heat to the tubes, the temperature attained in this zone is not great enough to adequately bake out regular Plibrico Jointless Firebrick. Where ordinary laid-up firebrick construction is employed, it is just a matter of time until the bricks bulge and lean over against the tubes—reducing the effective heating surface of the boiler and allowing the heat to attack the common brick walls.

Plibrico Air-Set is the answer to the problem. It is a simple matter to install this material alongside the tubes. In existing settings where the original firebrick lining must be replaced, Plibrico Air-Set can be installed without tearing down the common brick exterior walls. In either new or existing settings, Plibrico Air-Set can be anchored to the common brick wall so that it will remain in place even when the firebrick lining in the firebox below is removed for replacement.

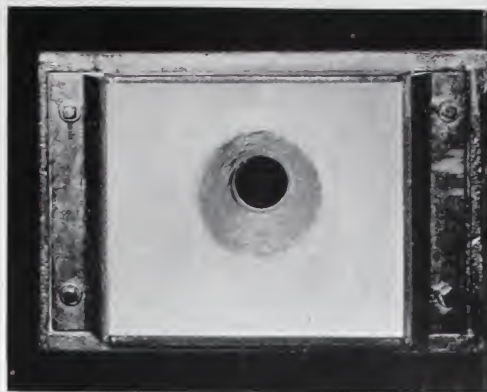
In vertically-baffled water tube boilers, Plibrico Air-Set can also be used for lining the soot chamber. By combining regular Plibrico Jointless Firebrick for the high-temperature zones with Plibrico Air-Set for the lower-temperature zones, any boiler can be provided with a 100% complete monolithic Plibrico lining. In the average boiler, Plibrico Air-Set No. 15 is usually adequate, although in connection with certain boilers Plibrico Air-Set No. 27 is required for certain sections alongside the tubes in the first pass.

TUBE DECKS

As shown in the sketches below and on the opposite page, Plibrico Air-Set is also used for the construction of the decks over the tubes of a water tube boiler. Plibrico Air-Set is ideal for



Right: Showing use of Plibrico Air-Set in connection with Keeler "Double-Duty" boiler.



Inspection door lined with Plibrico Air-Set.

this application since it eliminates the leaky joints of tile construction which allow the furnace gases to escape into the boiler room.

Air-Set No. 15 is ordinarily used for this application.

DOOR LINERS

Regular Plibrico Jointless Firebrick cannot be used for door liners because of the fact that the doors usually are not subjected to high temperatures, but Plibrico Air-Set is ideal for this purpose. Plibrico Air-Set forms a one-piece liner, as hard as concrete, without any individual brick to jar loose when the door is slammed shut.

It's a simple matter to line a door with Plibrico Air-Set. The door is first removed from its hinges and laid flat. Then the proper amount of water is added to Plibrico Air-Set and the mixture is poured into the door casting. The door should then be allowed to stand until the material sets.

The cone for an observation port in connection





Rear wall of ashpit constructed by pouring Plibrico Air-Set behind forms.

with an inspection door, as shown in the photograph on the preceding page, can be constructed by the use of a simple form. No. 27 should always be used for door liners.

The photograph at the bottom of the preceding page shows the use of Plibrico Air-Set No. 27 in connection with a Keeler "Double-Duty" boiler. In this installation, Plibrico Air-Set was used to line the circular rear combustion chamber and the large rear doors as well as for the rear arch.

Plibrico Air-Set is ideal for use in connection with the rear combustion chamber of any Economic type boiler. No. 27 should always be used in this application.

ASH PITS

The photograph above shows the use of Plibrico Air-Set for the rear wall of an ash pit in connection with a 500 hp. boiler equipped with an underfeed stoker. Because of its resistance to temperature, abrasion, and moisture, Plibrico Air-Set is a splendid material for this purpose. This material is also used extensively for lining ash hoppers.

Plibrico Air-Set No. 15 can ordinarily be used for ash pits, although in certain cases No. 27 is required to meet unusual conditions.

Showing use of Plibrico Air-Set for gate tile for use in connection with chain grate stoker.



SPECIAL SHAPES

Plibrico Air-Set is extensively used for making pre-cast refractory shapes such as burner blocks, soot blower protection tile, etc. Such shapes can be easily cast of Plibrico Air-Set by constructing simple wooden moulds.



Gas burner block moulded of Plibrico Air-Set. Typical of the wide variety of complicated shapes easily constructed with this material.

As shown at the bottom of the page, an interesting use of Plibrico Air-Set is for gate tile for use in connection with chain grate stokers. In this application, the high resistance of Plibrico Air-Set to mechanical abrasion is a valuable characteristic.

Special refractory shapes are generally subjected to high temperatures and should usually be made of No. 27 although No. 15 can be used for certain applications.

OTHER USES

This catalog hardly begins to suggest the wide range of application of Plibrico Air-Set in the two grades in which it is manufactured. This material can be used for poured linings of all kinds wherever extreme temperatures are not encountered, and particularly where resistance to mechanical abrasion or moisture is required.

PLIBRICO BAFFLE-MIX

PLIBRICO Baffle-Mix is an air-setting refractory material especially formulated for building monolithic baffle walls in connection with water tube boilers. It is also an ideal material for repairing old baffles which have been damaged by the removal of tubes, since it is a simple matter to patch around the tubes with Plibrico Baffle-Mix.

This material is shipped dry in 100-lb. sacks. After being mixed with water and installed between the necessary wooden forms Plibrico Baffle-Mix sets to a concrete-like hardness, giving a solid, monolithic baffle without any cracks or leaks.

For baffle work, approximately 110 lbs. of Plibrico Baffle-Mix is required per cubic foot. Baffles should ordinarily be installed 4 inches thick. The following quantities may be used to calculate the amount of material required for any baffle, flat deck, or curtain wall:

2" thick.....	20 lbs. per sq. ft.
3" thick.....	30 lbs. per sq. ft.
4" thick.....	40 lbs. per sq. ft.

Your local Plibrico representative would be pleased to quote on Plibrico Baffle-Mix and to assist you in calculating your requirements for any baffle work.



Before installation, Plibrico should be mixed with water to the proper consistency for installation. After installation, baffles constructed of Plibrico Baffle-Mix should be allowed to stand at least 24 hours before heat is applied. Detailed instructions for the installation of Plibrico Baffle-Mix are furnished with each shipment.

PLIBRICO HEARTH CEMENT

PLIBRICO Hearth Cement is an air-setting refractory material with a P.C.E. of 2500 deg. F. This material is of finer grind and somewhat more workable than Plibrico Air-Set, and can be built up without forms.

Plibrico Hearth Cement was developed primarily for the construction of refractory hearths in connection with rotary oil burners. However, it can be used wherever an air-setting material is required which is finer and more workable than Plibrico Air-Set.

This material has been used extensively for repairing cook stoves and ranges in homes, restaurants, hotels, camps, galleys, etc. It has also been widely used for lining cracked cast-iron fire bowls

in connection with hot air heating furnaces.

Plibrico Hearth Cement is shipped in 100-lb. bags. It weighs 110 lbs. per cubic foot installed. For linings built up without forms, it should be mixed in the proportions of 1 part of water to 3 parts of Hearth Cement (by volume). Where poured behind forms a mixture of 5 parts of water to 12 parts of cement (by volume) may be used. After installation, the material should be allowed to stand at least 12 hours before heat is applied.

The nearest Plibrico representative would be glad to give you more detailed information about Hearth Cement and to quote on your requirements.



DEMON HIGH-TEMPERATURE CEMENTS

WE are the manufacturers of two high-temperature cements for laying firebrick and coating furnace walls — Demon Air-Set and Demon Heat-Set.

While each cement has its own particular field of application, they are alike in that they both show negligible drying and burning shrinkage, form a strong bond capable of withstanding abrasion and vibration, and possess a high degree of resiliency.

Both cements are ground exceedingly fine. In consequence, they can be readily mixed to an easy-working mortar.

DEMON AIR-SET

Demon Air-Set High-Temperature Cement is an "all-purpose" cement in moist, plastic form. It can be used under a wide variety of combustion conditions.

This cement sets cold upon exposure at room temperatures without the application of heat. In refractory quality, it is superior to many of the competitive air-setting cements on the market.

The shrinkage of Demon Air-Set is negligible. It does not swell or crack. It is ground to unusual

fineness and, in consequence, works easily and smoothly under the trowel.

Demon Air-Set is shipped moist in air-tight steel drums containing 100, 200, or 500 lbs., also in 50-lb. pails. From 400 to 500 lbs. are required to lay 1,000 firebrick.

DEMON HEAT-SET

Demon Heat-Set Super-Refractory Cement is a dry, powdered cement which is recommended for the most severe combustion conditions. The P.C.E. of Demon Heat-Set is Seger cone 32-33. It can be used for furnace brickwork in connection with all types of furnaces where temperatures of 1400 deg. F. or higher are attained.

Demon Heat-Set has been on the market for almost two decades, and in that time has earned an enviable reputation for dependability and reliability. It is extremely popular among brick masons. It mixes readily with cold water and spreads easily as a result of its fine, even texture. Demon Heat-Set is shipped dry in 100 lb. sacks. It requires only water to bring it to workability. Approximately 400 lbs. of Demon Heat-Set are required to lay 1,000 firebrick.

Ask for our special bulletin covering Demon Cements.

WAREHOUSE STOCKS EVERYWHERE

AS listed below, warehouse stocks of Plibrico refractory products are maintained at over 100 industrial centers in the United States and Canada. Plibrico products can be delivered to practically any point in the United States or Canada 24 hours after receipt of the order.

FRESH MATERIAL

When you receive Plibrico Jointless Firebrick from one of our warehouse stocks, you invariably receive fresh material in perfect condition for immediate installation. You do not receive material that has dried out. It is not necessary to re-condition the material.

There are two reasons for this. First, the demand for Plibrico is so great that warehouse stocks are continuously renewed by fresh carload shipments

from the factory. Second, Plibrico retains its plasticity for many months in the air-tight containers in which it is shipped.

ESTIMATING SERVICE

At least one Plibrico representative is located in each of the cities listed. The local Plibrico representative would be glad to call at your plant at any time—day or night, Sundays and holidays included—to make a careful inspection of your furnaces and to quote on monolithic Plibrico construction for any repairs necessary, including labor for installation if desired. This service is furnished without charge or obligation.

The boiler setting and repair service which our organization provides is covered in the following pages.

ALABAMA

Birmingham

Mobile

ARIZONA

Phoenix

ARKANSAS

Little Rock

Texarkana

CALIFORNIA

Los Angeles

Oakland

San Diego

San Francisco

Wilmington

COLORADO

Denver

CONNECTICUT

Bridgeport

FLORIDA

Jacksonville

Tampa

Winter Haven

GEORGIA

Atlanta

Savannah

ILLINOIS

Chicago

Peoria

INDIANA

Fort Wayne

Indianapolis

Evansville

Richmond

Terre Haute

IOWA

Davenport

Des Moines

Dubuque

KENTUCKY

Louisville

Paducah

LOUISIANA

New Orleans

Shreveport

MAINE

Portland

MARYLAND

Baltimore

MASSACHUSETTS

Boston

Springfield

MICHIGAN

Detroit

Flint

Grand Rapids

Kalamazoo

Saginaw

MINNESOTA

Duluth

Minneapolis

MISSISSIPPI

Jackson

MISSOURI

Kansas City

St. Louis

MONTANA

Butte

NEBRASKA

Omaha

NEW YORK

Binghamton

Brooklyn

Buffalo

New York City

Syracuse

Troy

Rochester

Utica

NEW JERSEY

Camden

Newark

Trenton

NORTH

CAROLINA

Charlotte

High Point

Raleigh

OHIO

Akron

Canton

Cincinnati

Cleveland

Columbus

Dayton

Firebrick

Toledo

OKLAHOMA

Oklahoma City

Tulsa

OREGON

Portland

PENNSYLVANIA

Erie

Harrisburg

Philadelphia

Pittsburgh

RHODE ISLAND

Providence

SOUTH CAROLINA

Greenville

TENNESSEE

Chattanooga

Knoxville

Memphis

Nashville

TEXAS

Dallas

El Paso

Houston

San Antonio

Texarkana

UTAH

Salt Lake City

VIRGINIA

Roanoke

WASHINGTON

Aberdeen

Bellingham

Everett

Seattle

Spokane

Tacoma

WEST VIRGINIA

Charleston

WISCONSIN

Madison

Menasha

Milwaukee

Wausau

CANADA

Brantford, Ont.

Calgary, Alta.

Edmonton, Alta.

Halifax, N. S.

Kirkland Lake, Ont.

Montreal, Que.

New Toronto, Ont.

Regina, Sask.

St. John, N. B.

Saskatoon, Sask.

Vancouver, B. C.

Winnipeg, Man.

GREAT BRITAIN

Birmingham

Bristol

Cardiff

Glasgow

Leeds

Liverpool

London

Manchester

Newcastle

Swansea

FOREIGN

ARGENTINA

Buenos Aires

AUSTRALIA

Melbourne

Sydney

BELGIUM

Brussels

BRITISH

WEST INDIES

Barbados

Trinidad

CHILE

Valparaiso

CHINA

Shanghai

CUBA

Havana

FRANCE

Paris

JAPAN

Osaka

HAWAII

Honolulu

HOLLAND

Rotterdam

ITALY

Genoa

MEXICO

Mexico City

NEW ZEALAND

Wellington

PHILIPPINES

Manila

PORTO RICO

San Juan

SOUTH AFRICA

Johannesburg

STRAITS

SETTLEMENT

Singapore



*Plibrico
masons at
work.*

BOILER SETTING SERVICE

WE maintain a nation-wide boiler setting service. With all of the resources of our boiler setting department at his disposal, your local Plibrico representative is in a position to handle any boiler setting or repair job to your entire satisfaction.

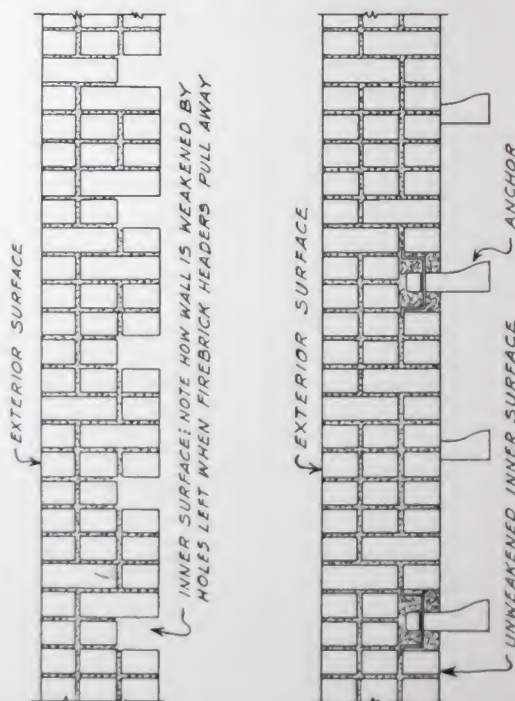
We mine our own clays from our own mines, manufacture our own refractory materials, and install them with our own boiler setting organization. When you place a job in the hands of your Plibrico representative, he takes full responsibility for both material and workmanship.

Plibrico masons are skilled and competent craftsmen with many years of experience in boiler masonry. They are not "bungalow bricklayers."

If you expect to install new boilers, or reset existing units, we will be glad to submit our proposal on the complete setting including both the erection of the exterior brickwork and the installation of the refractory lining. Blueprints should be sent to your local Plibrico representative.

UNWEAKENED BRICKWORK

The sketches opposite show an important superiority of the type of common brick wall erected for a Plibrico setting. As shown at the left in the sketch, the common brick wall constructed in



Sketch contrasting common brick wall for a firebrick lining (left) with similar wall for a Plibrico lining (right). No missing courses in the wall at the right.

connection with a firebrick lining is weakened by the firebrick headers. In service, many of these headers pull out (as explained on pages 10 and 11) leaving holes in the common brick wall.

No firebrick headers are required with a common brick wall erected in connection with a Plibrico lining. As shown at the right in the sketch, our common brick walls are solid, substantial, and unweakened.

In a firebrick setting, the common brick wall and the firebrick lining must be built up simultaneously. Consequently, the interior surface of the common brick wall cannot be inspected and indifferent workmanship is the common result. In a Plibrico setting, the Plibrico lining is not installed until the common brick walls have been finished, so both surfaces of our common brick walls can be inspected upon completion. No careless workmanship can be covered up.

ENGINEERING SERVICE

Your local Plibrico engineer offers you the wide experience of our engineering department if you are confronted with any problem of furnace design, inefficient combustion, smoking, etc. Our engineering department is widely recognized as an authority on the subject of furnace design for the most efficient utilization of all types of fuels—coal, oil, gas, wood refuse, bagasse, etc.

In numerous plants, large quantities of fuel are being wasted because boiler furnaces are inefficient and old-fashioned in design. Resetting such boilers to put into effect the developments of modern practice will make big economies. Plants for which we have modernized boiler settings report savings as great as 25% of the fuel. Our engineering department will be pleased to prepare blueprints for you if changing the design of your furnaces will save fuel and money. Just call in the local Plibrico representative.

PLIBRICO STEEL-CASED SETTING

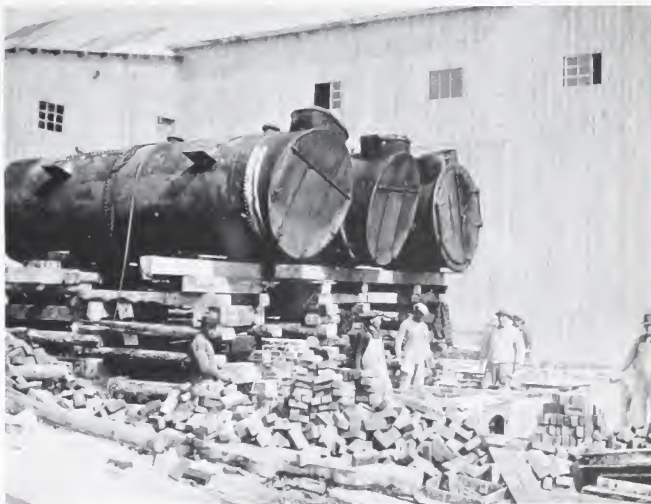
The photograph at the right shows a typical installation of the Plibrico Steel-Cased Setting. The advantages of this type of setting are so many that it is entitled to consideration wherever new boilers are being installed or existing units are being reset.

We would be pleased to send you a copy of the catalog which we recently published describing this type of setting in detail.

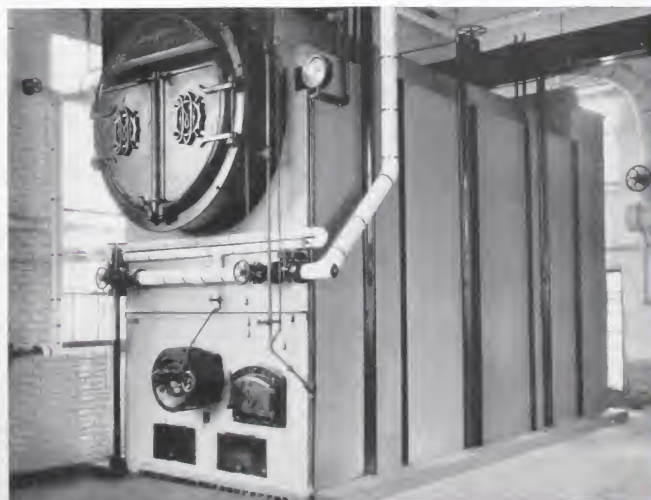
The Plibrico Steel-Cased Setting as erected by our organization in connection with a 200 hp. boiler recently installed at a Massachusetts laundry.



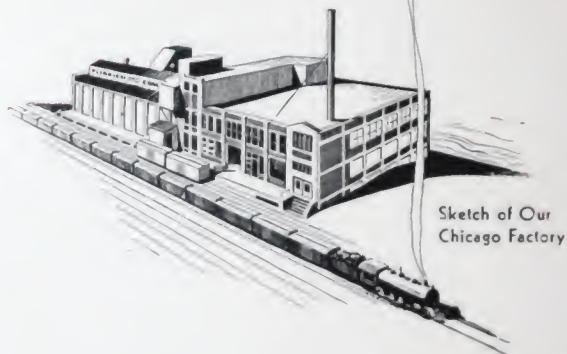
One 615 hp. and two 350 hp. Stirling boilers set by our organization at a wood-working plant in Wisconsin. A typical example of the work we are doing.



Settings for three 150 hp. H.r.t. boilers under construction by our organization at a new lumber mill in the remote little town of Sultan, Ontario.



WHEN you have reached this final page, we wish to express our appreciation of the consideration that you have given to our products. After reading our general catalog, we are confident that you will wish to become better acquainted with Plibrico Jointless Firebrick and our other refractory materials. We wish to take this opportunity to remind you that your local Plibrico representative will be pleased to call at your plant at any time to quote on your requirements.



Sketch of Our
Chicago Factory